# Summer 2009 Climate Summary For Southwest Lower Michigan

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The 2009 summer season over Southwest Lower Michigan featured much below normal temperatures and above normal precipitation (Table 1). The frequency of severe thunderstorm episodes and days with highs at or warmer than 80 degrees was below normal.

**TABLE 1. Reported temperature and precipitation for the summer of 2009 at selected climate stations in Southwest Lower Michigan. Normals are computed from 30-year averages from 1971-2000.**

| Location | | Temperature (F) | Precipitation (inches) | Snowfall (inches) |
|---|---|---|---|---|
| | | | | |
| **Grand Rapids** | *Reported* | 67.9° | 13.26 | 0.0 |
| | *Normal* | 69.3° | 11.01 | 0.0 |
| | *Departure* | -1.4° | +2.25 | 0.0 |
| | | | | |
| **Lansing** | *Reported* | 66.9° | 13.81 | 0.0 |
| | *Normal* | 68.3° | 9.74 | 0.0 |
| | *Departure* | -1.4° | +4.07 | 0.0 |
| | | | | |
| **Muskegon** | *Reported* | 66.5° | 8.77 | 0.0 |
| | *Normal* | 67.8° | 8.67 | 0.0 |
| | *Departure* | -1.3° | +0.10 | 0.0 |

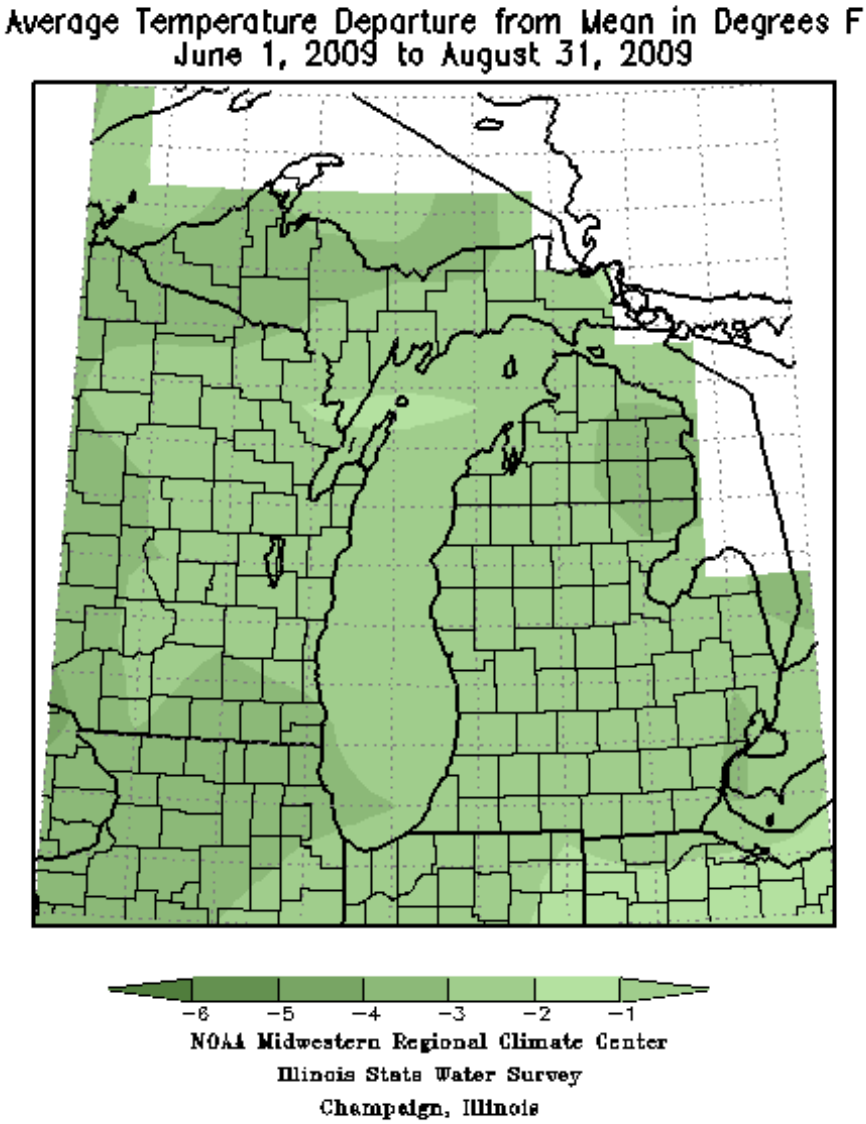


**Figure 1. The summer 2009 daily mean temperature departure from normal for Michigan.**

The area averaged summer mean temperature was 66.1°F, which is 2.3°F colder than the 1971 to 2000 normal. Figure 1 displays the below average temperatures. This was the fourth coldest summer for Southwest Lower Michigan since records began in 1895. The coldest summer on record was the summer of 1992, which averaged 64.0 degrees. Three of the top five coldest summers have occurred in the past 20 years (Table 2). By comparison, the summer of 2008 was 0.1°F colder than normal. The NCDC state ranking map (Figure 2) reveals Michigan was much colder than normal for the summer of 2009. In 2009 the State of Michigan experienced the fifth coldest summer on record.

**Table 2. The top 10 coldest summers for all of Southwest Lower Michigan using the 36 long-term climate stations.**

| Rank | Year | Summer Temp. | Departure from Normal |
|---|---|---|---|
| **1** | 1992 | 64.0 | -4.4 |
| **2** | 1915 | 65.0 | -3.3 |
| **3** | 2004 | 65.9 | -2.4 |
| **4** | 2009 | 66.1 | -2.3 |
| **5** | 1950 | 66.4 | -2.0 |
| **6** | 1965 | 66.4 | -1.9 |
| **7** | 1982 | 66.5 | -1.9 |
| **8** | 1985 | 66.5 | -1.8 |
| **9** | 1903 | 66.6 | -1.8 |
| **10** | 1958 | 66.6 | -1.7 |

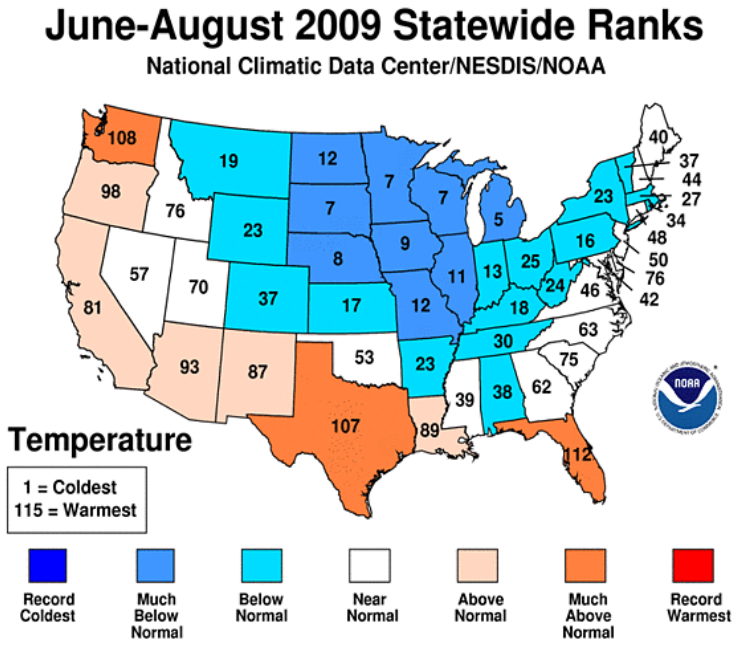


**Figure 2. The summer 2009 temperature ranking for the contiguous United States.**

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Looking at all the summers from 2000 through 2009 for Southwest Lower Michigan, there is a recent trend toward warmer summers when considering all thirty-six climate stations (Figure 3). Four of the past ten summers have been warmer than normal while three were colder than normal, leaving three summers near normal (Figure 4). Even though the summer of 2009 was colder than normal, more summers have been warmer than normal during this period as opposed to colder than normal. The temperature summary for Grand Rapids is displayed in Figure 5.

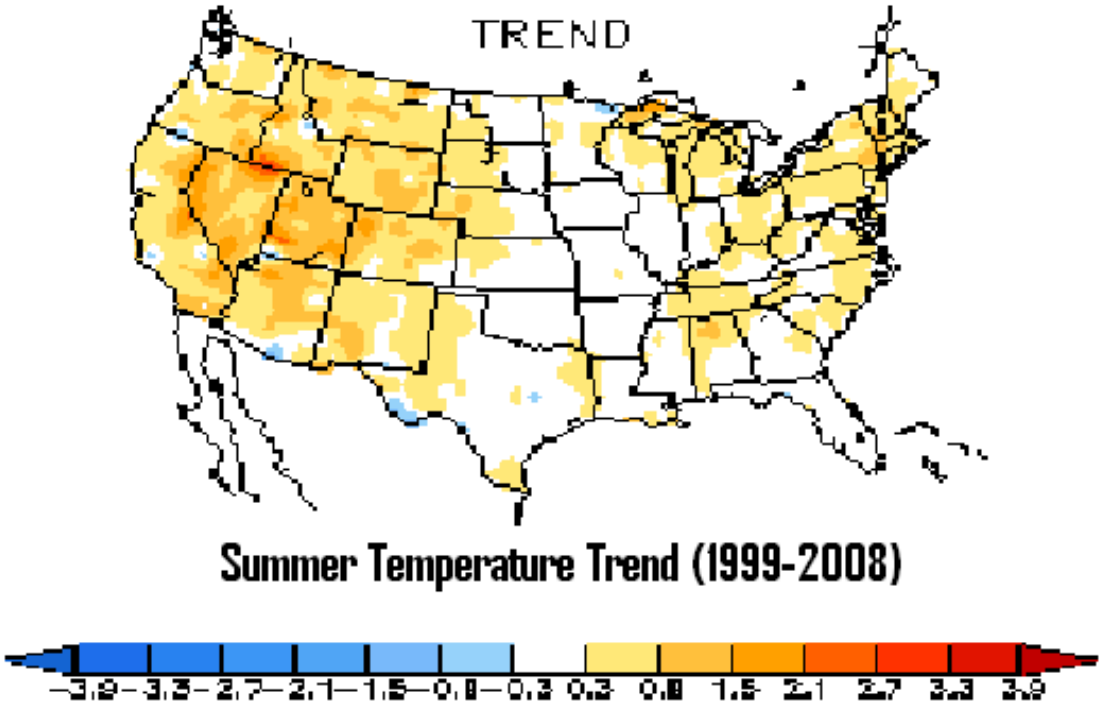


**Figure 3. Summer (June-August) temperature trend. The trend is the mean temperature over the past ten years (1999-2008) minus the 1971-2000 mean.**

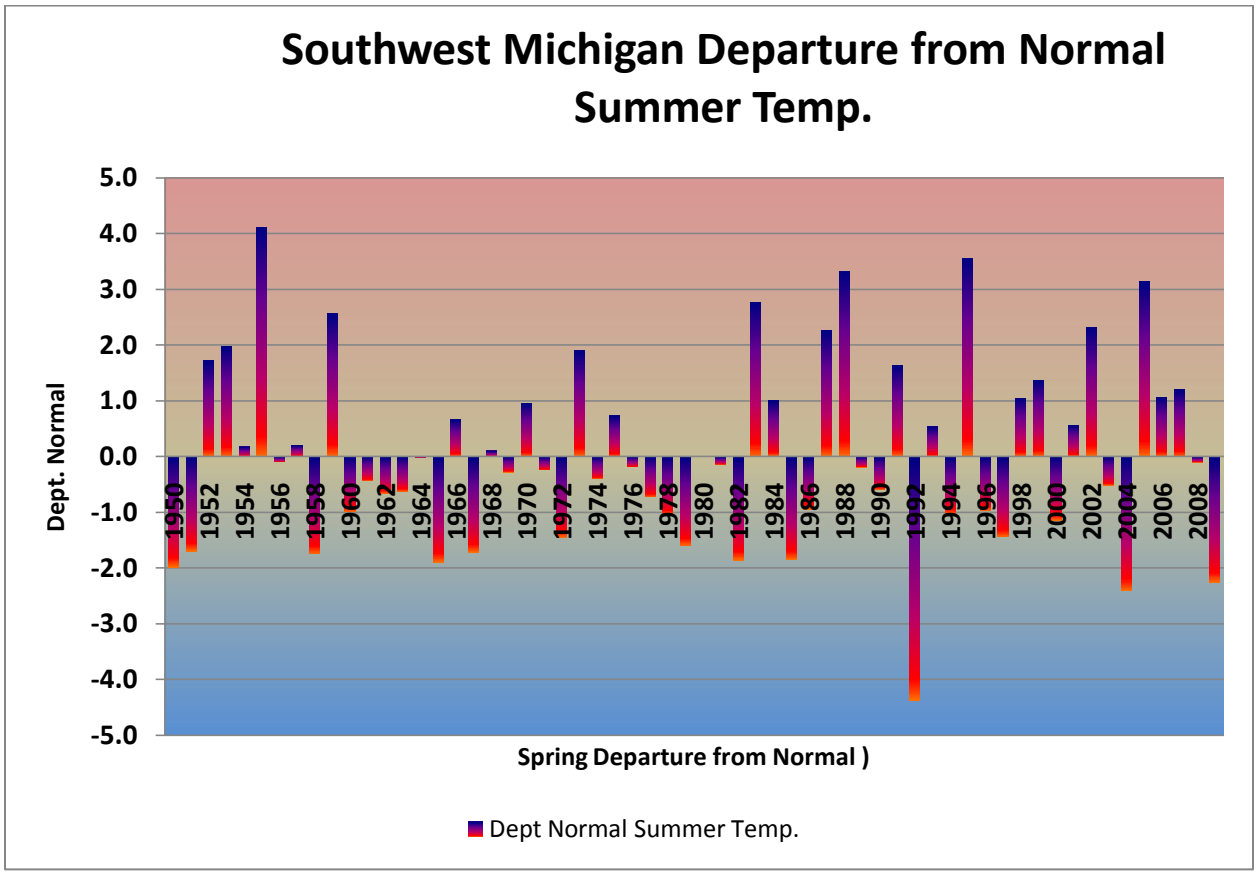


**Figure 4. The graph above shows the summer mean area temperature departure from normal for all of Southwest Lower Michigan, from 1950 through 2009.**

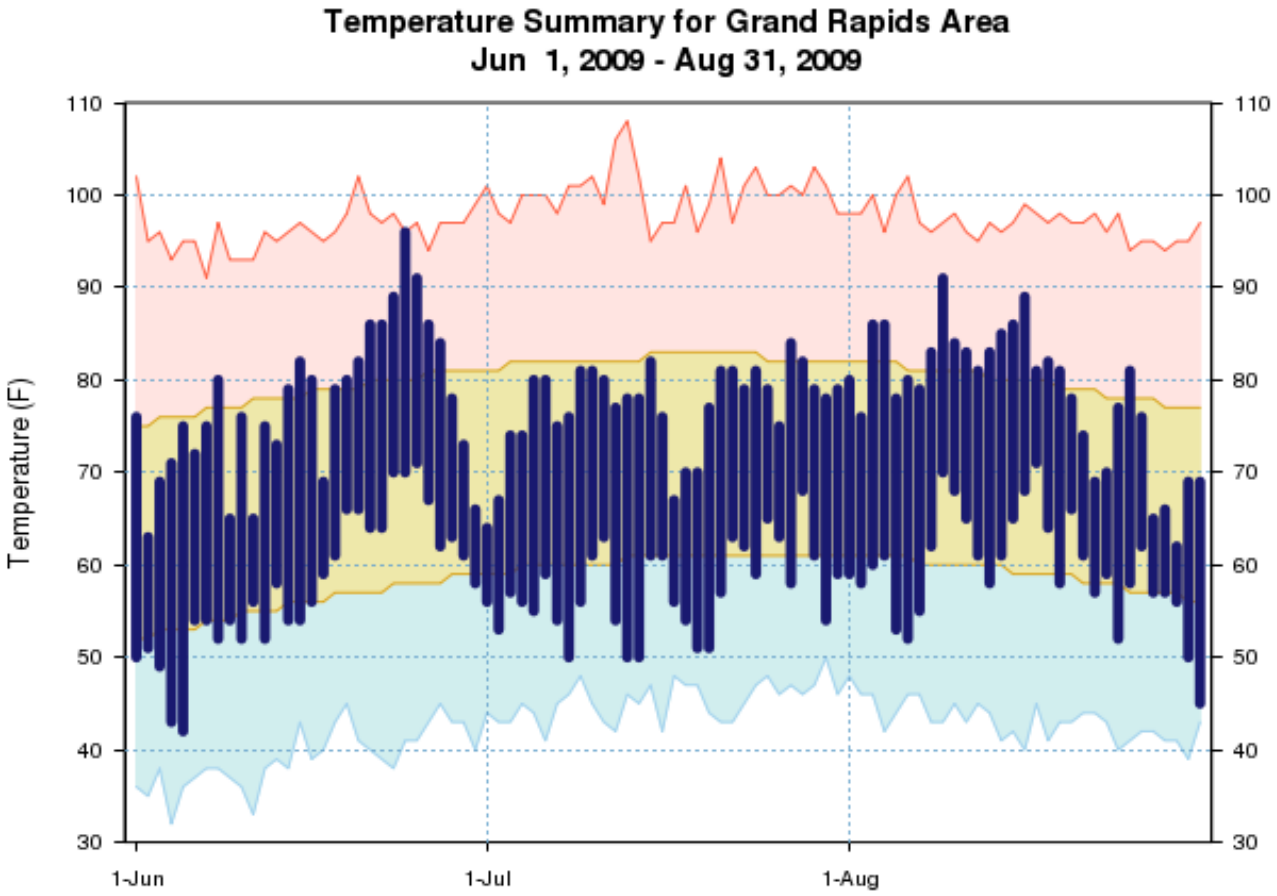


**Figure 5. Summer 2009 daily temperatures for Grand Rapids. The daily maximum and minimum temperatures area connected are connected by dark blue bars. Area between the maximum and minimum temperature has tan shading. Red lines connect the record high temperatures. Blue lines connect the record low temperatures.**

Figures 5 through 8 show mostly below normal daily temperatures for this past summer. The third week of June was the warmest part of the summer. The frequency of highs at or above 80 degrees was unusually low across Southwest Lower Michigan. Grand Rapids normally has 67 days with highs of 80 degrees or more, but experienced only 48. To find a year with a lower total, you have to go back to the year 2000, when there were only 42 days. There were only three days with highs of 90 degrees or warmer, compared to the normal of ten days. The last summer to have an above normal number of days with highs of 90 degrees or warmer was in 2007, when there were 27 days. This summer's highest temperature was 96 degrees on June 24th.

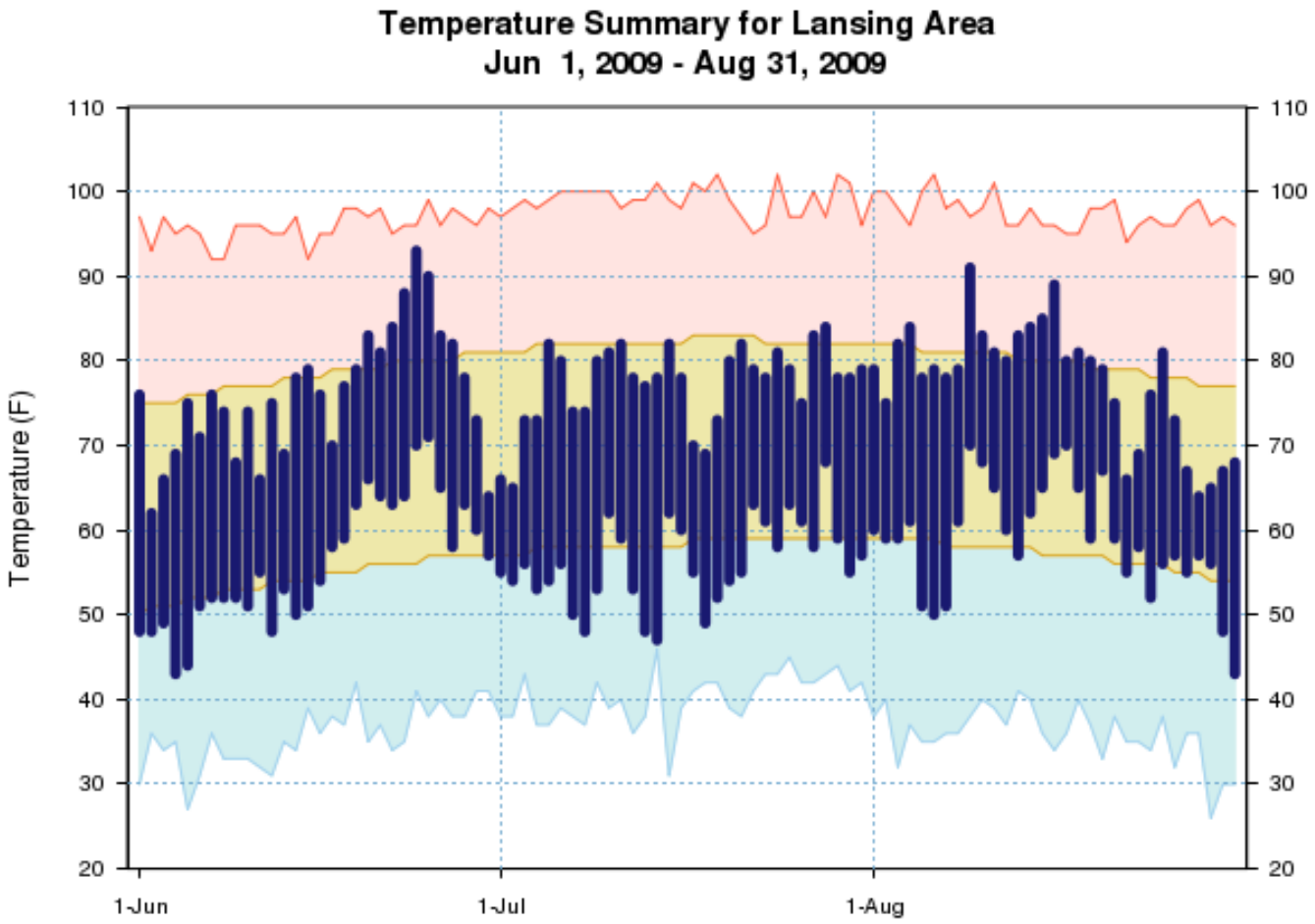


**Figure 6. Same as Figure 5, expect for Lansing.**

Lansing normally has 69 days with highs of 80 degrees or more; there were only 38 in 2009. Records indicate 1866 had the fewest 80+ degree days at thirty-four. There were only three days in 2009 with highs of 90 degrees or warmer, compared to the normal of nine days. The last summer to have more than the normal number of days with highs of 90 degrees or higher was in 2007, when there were twelve days. The highest temperature was 93 degrees on June 24th.

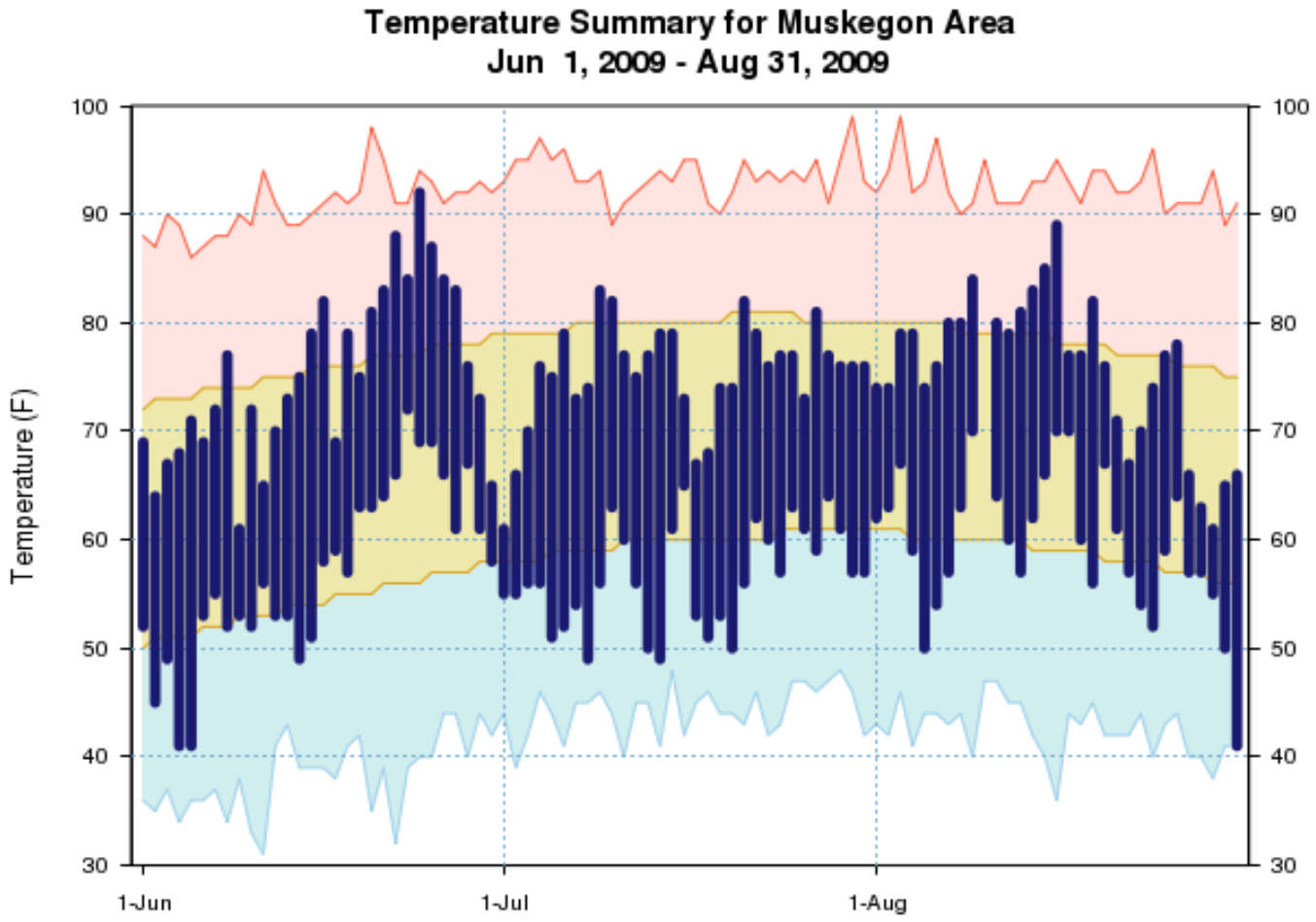


**Figure 7. Same as Figure 6, expect for Muskegon.**

Muskegon normally has 50 days with highs of 80 degrees or more; there were only 30 in 2009. Records indicate 1992 had fewer 80+ degree days at twenty-five. There was only one day with a high of 90 degrees or warmer; in a typical summer, there are three days with highs of 90 degrees or warmer. The last summer to have more than the normal number of days with highs of 90 degrees or higher was in 2005, when there were eight days. The highest temperature was 92 degrees on June 24th.

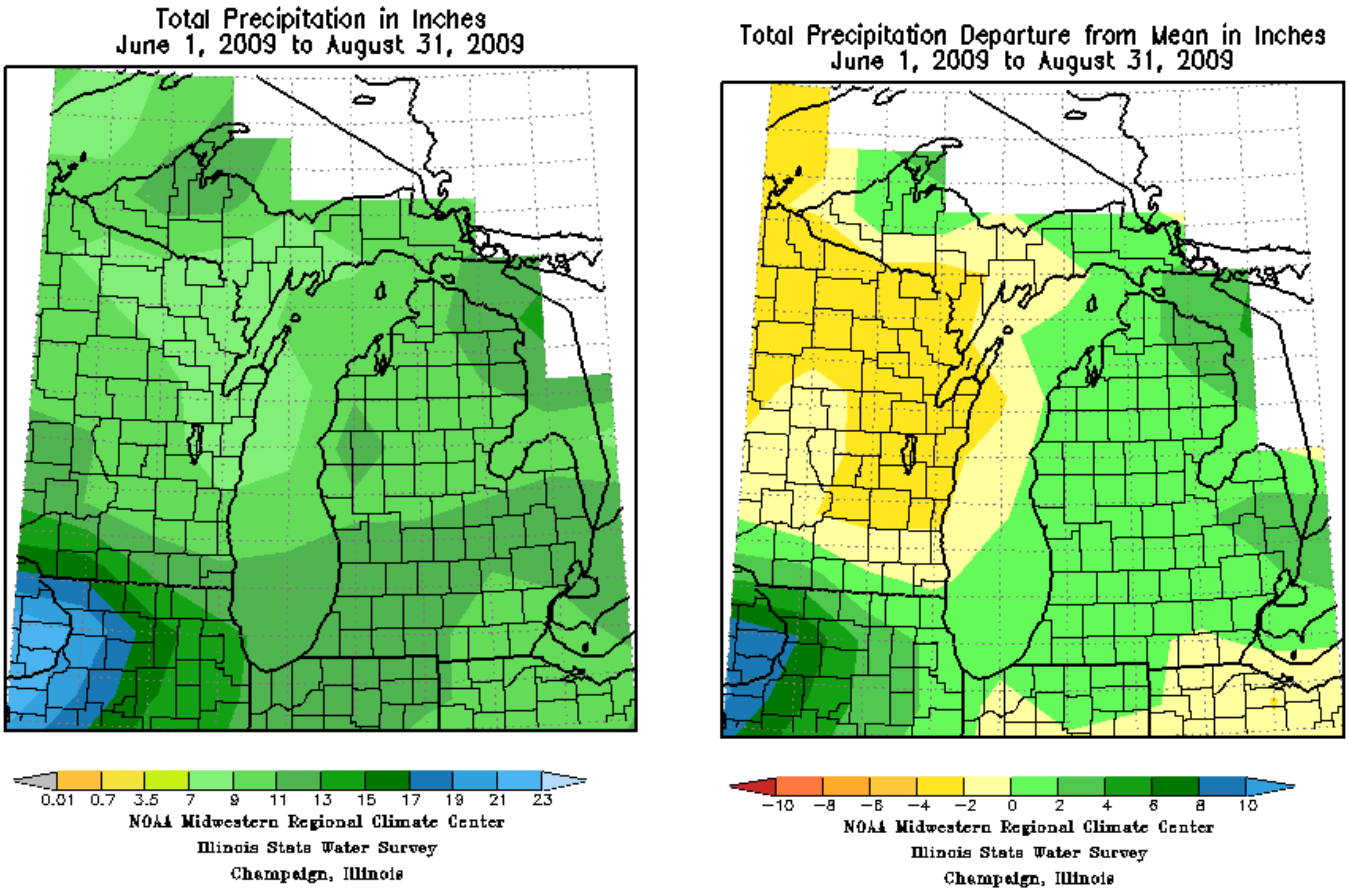


**Figure 8. Summer total precipitation (a) and departure from normal (b) for Michigan.**

The total precipitation ranged from 8.30 inches in Brooklyn to 13.65 inches at Gull Lake. There was a fairly widespread coverage of 9 to 11 inches (Figure 8a). The mean precipitation for Southwest Lower Michigan was 10.31 inches, which was 0.05 inches above normal. Most areas of Southwest Lower Michigan were between a half inch below normal and one and a half inches above normal (Figure 8b). For the state of Michigan, this was the 67$^{th}$ wettest summer out of 115 years (Figure 9). For Southwest Lower Michigan, the ranking was 85$^{th}$ wettest out of 115 years. During the past fifteen years (1995 to 2009), there has been no significant trend toward either wetter or drier summers over Southwest Lower Michigan, although drier summers were significantly drier than normal when they occurred (Figure 10). During this time, three years were wetter than normal (1999, 2000 and 2004), four years were below normal (1998, 2002, 2003, and 2005) and eight years were near normal (1995, 1996, 1997, 2001, 2006, 2007, 2008 and 2009) (Figure 11).

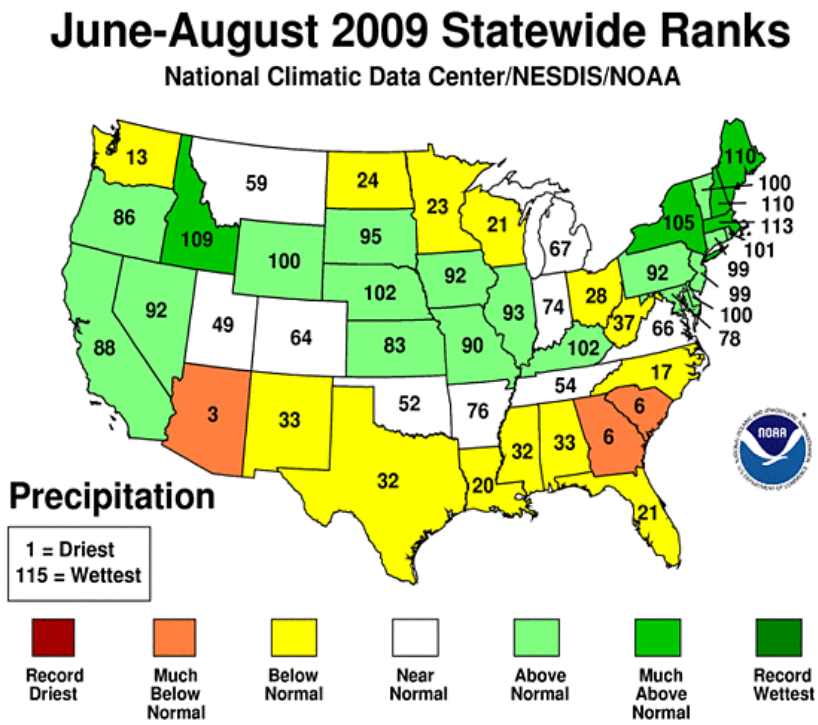


**Figure 9. The NCDC summer precipitation ranking for the contiguous United States.**

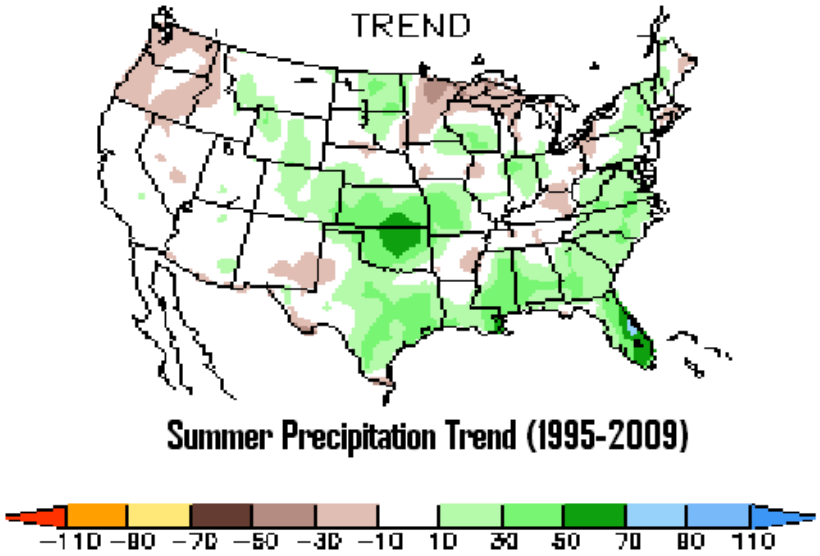


**Figure 10 Summer precipitation trend.**

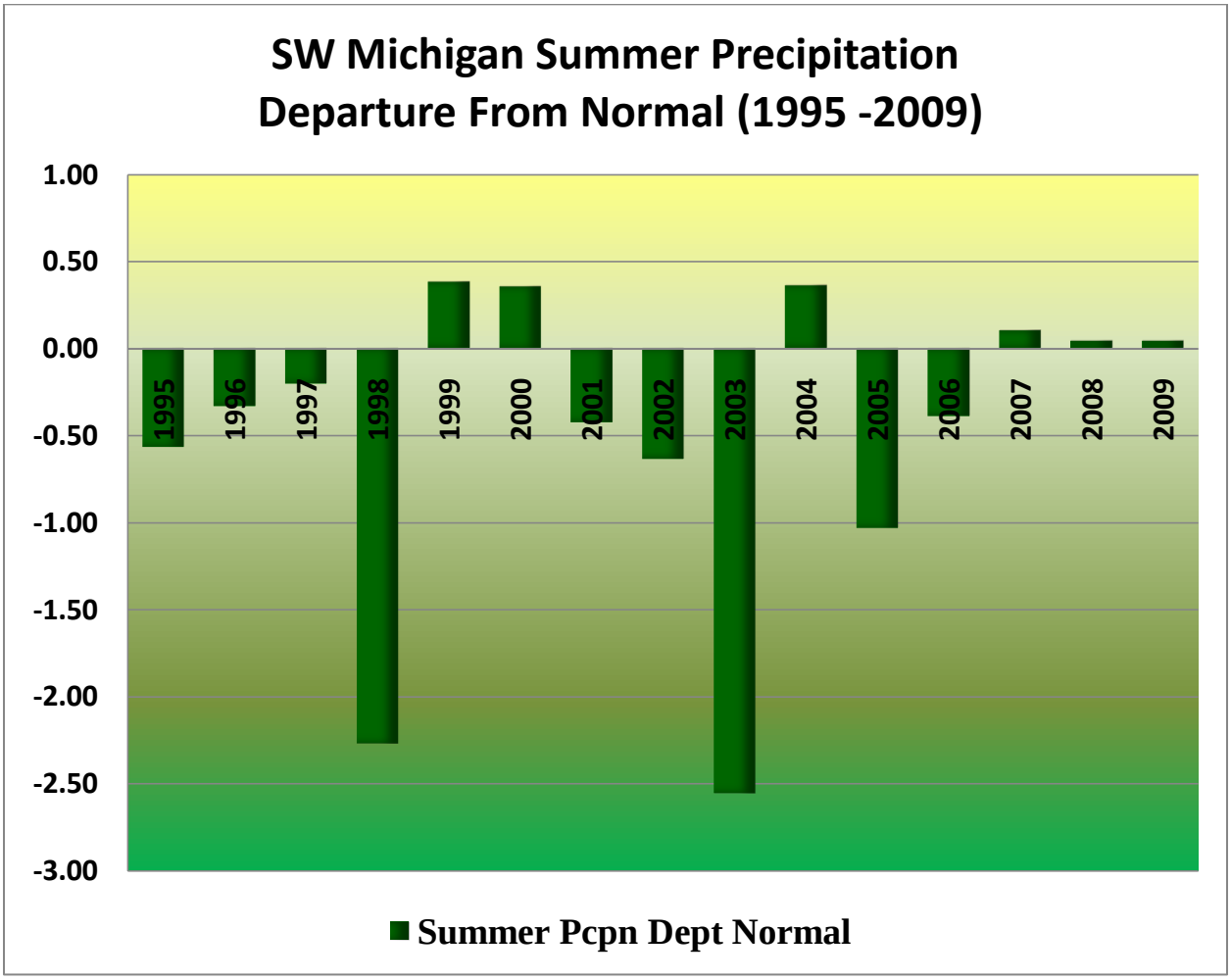


**Figure 11. Total summer precipitation departure from normal for all of Southwest Lower Michigan from 1995 through 2009 (most recent trend period).**

As for the daily precipitation distribution, Grand Rapids and Lansing received the heaviest precipitation in June, but both July and August remained wet enough to keep the total precipitation for the summer above normal (Figs. 12 and 13). Muskegon was one of the drier areas, as precipitation totals fell below normal in early July and stayed below normal through the remainder of the summer (Figure 14).

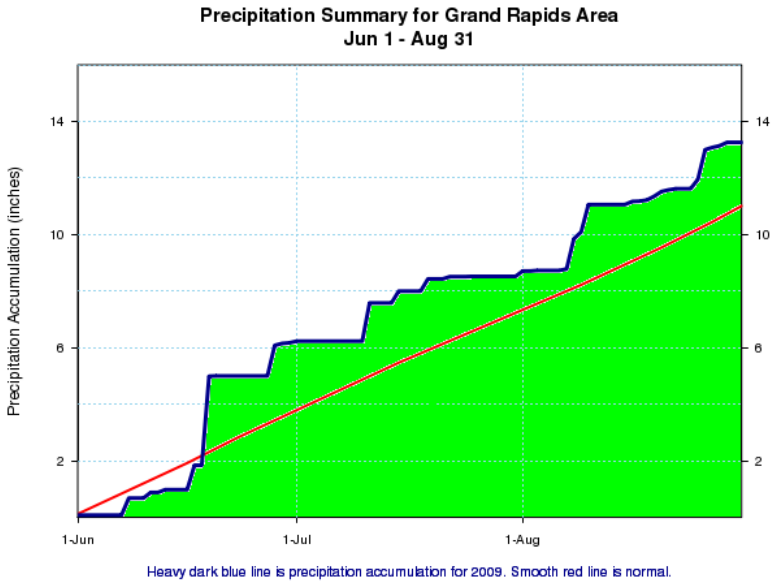


**Figure 12. Grand Rapids daily precipitation accumulation for the summer of 2009.**

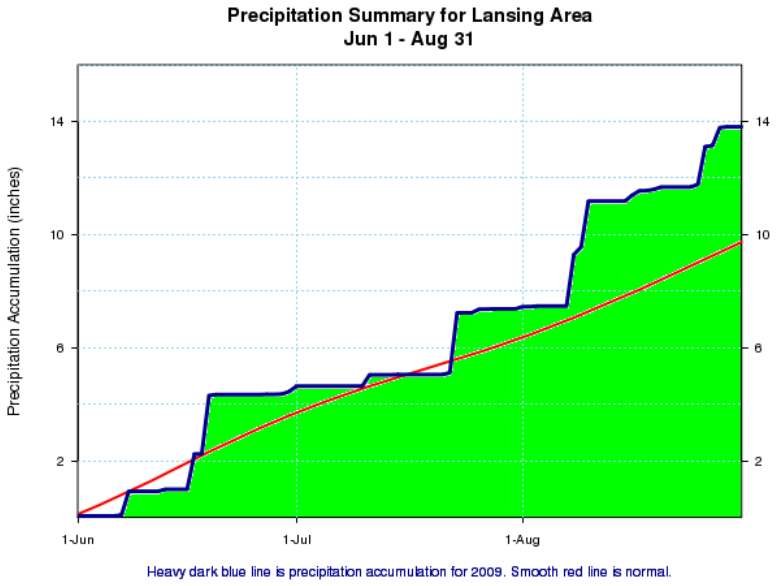


**Figure 13. Lansing daily precipitation accumulation for the summer of 2009.**

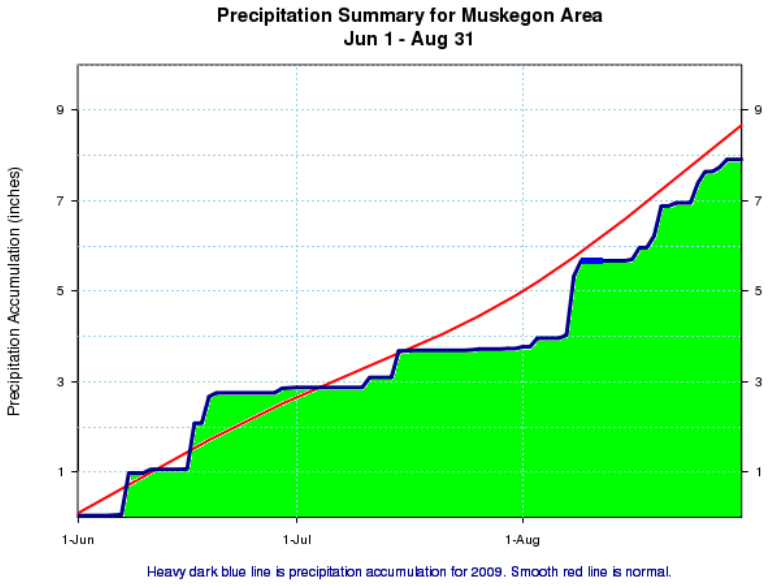


**Figure 14. Muskegon daily precipitation accumulation for the summer of 2009.**

There were five severe weather episodes during the summer months in 2009, as depicted in Figure 15. That was well below the 2001-2009 average of ten severe thunderstorm episodes per summer. It was the lowest total number of episodes since 1995, when there were only four. The lowest total for severe weather episodes in a summer season since records began in 1986 was two in both 1989 and 1990.

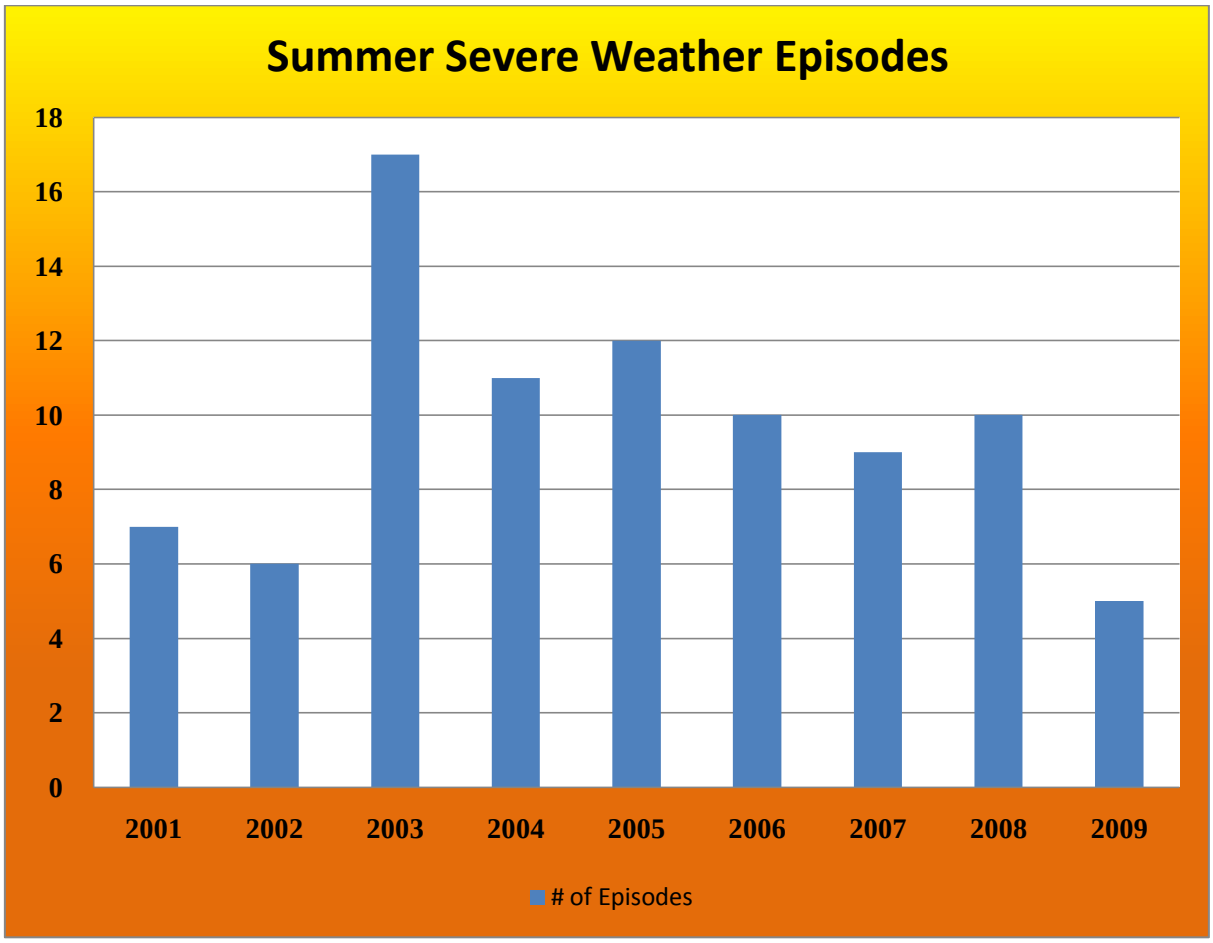


**Figure 15. Summer severe weather episode total from 2001 through 2009.**

# Summer 2009 Climate Summary For Southwest Lower Michigan

For more details on the individual precipitation events, see the monthly weather summaries listed below:

June 2009 Climate Summary .....http://www.crh.noaa.gov/images/grr/climate/CS200906.pdf

July 2009 Climate Summary.....http://www.crh.noaa.gov/images/grr/climate/CS200907.pdf

August 2009 Climate Summary.....http://www.crh.noaa.gov/images/grr/climate/CS200908.pdf